

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference F17985 SCF	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/IB2004/001717	International filing date (day/month/year) 26.05.2004	Priority date (day/month/year) 27.05.2003	
International Patent Classification (IPC) or national classification and IPC F41H11/16			
Applicant CSIR et al.			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

- (*sent to the applicant and to the International Bureau*) a total of 6 sheets, as follows:
 - sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
- (*sent to the International Bureau only*) a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

Date of submission of the demand 02.12.2004	Date of completion of this report 09.09.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Herrera, M Telephone No. +49 89 2399-2090



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
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Box No. I Basis of the report

- With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
 - With regard to the elements* of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

Description, Pages

2-12 as originally filed
1, 1a filed with telefax on 15.03.2005

Claims, Numbers

1-21 filed with telefax on 15.03.2005

Drawings, Sheets

1/3-3/3 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
 - 3. The amendments have resulted in the cancellation of:
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):
 - 4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - the description, pages
 - the claims, Nos.
 - the drawings; sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. II Priority

1. This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
 - copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
 - translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
 - the entire international application,
 - claims Nos. 19-21
 - because:
 - the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
 - the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 19-21 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet
 - the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
 - no international search report has been established for the said claims Nos.
 - the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form	<input type="checkbox"/> has not been furnished
	<input type="checkbox"/> does not comply with the standard
the computer readable form	<input type="checkbox"/> has not been furnished
	<input type="checkbox"/> does not comply with the standard
 - the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
 - See separate sheet for further details

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-18
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

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Re Item II

Priority

The priority of the present application was not available to the International Examining Authority at the time of drafting the present opinion. Any priority rights have therefore not been taken into account.

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claim 18-20 contain references to the description and the drawings. The claims with their present formulation are so unclear in the definition of the scope to protect that no meaningful opinion can be given here.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: PATENT ABSTRACTS OF JAPAN vol. 2002, no. 07, 3 July 2002 (2002-07-03) & JP 2002 090095 A (AKAZAWA TAKAO), 27 March 2002 (2002-03-27)
- D2: PATENT ABSTRACTS OF JAPAN vol. 2003, no. 03, 5 May 2003 (2003-05-05) & JP 2002 340499 A (IWAMOTO SATOSHI), 27 November 2002 (2002-11-27)
- D3: US-A-5 442 990 (KROHN WALTER) 22 August 1995 (1995-08-22)

The document D1, regarded as being the prior art closest to the subject-matter of claim 1, shows a vehicle with a mine detonating roller and a deflecting plate for interrupting the air blast, thereby protecting the operator.

D2 discloses a front roller imparting pressure against the ground with a cover to protect from the blast and sideways deflecting plates to remove debris.

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D3 describes an tilting plate able to enclose the areas where the explosion takes place or to be lifted and so shield the operator.

All found documents fail to disclose or suggest the use of any plate or deflector having an acoustic speed of 6000 m/s or higher, so that shock waves can be more efficiently diverted away from the area or cubicle in which the operator sits.

The subject-matter of the independent claims 1, 5 and 14 of the present application is therefore considered novel according to Article 33(2) PCT and the solution to the problem proposed appears to involve an inventive step withing the meaning of Article 33(3) PCT.

The industrial applicabitlity is evident.

Claims 2 to 17, as dependent claims, would also appear to meet the requirements of the PCT with respect to novelty inventive step and industrial applicability.

Re Item VIII

Certain observations on the international application

Claims 18 to 20 contain references to the description or drawings. Their wording makes it impossible to delimit the scope of protection, so that it renders the claims unclear.

According to Rule 6.2(a) PCT, claims should not contain references to except where absolutely necessary (cf. PCT Guidelines, C-III, 4.10). Such is, however, not the case here.

PROTECTION AGAINST LANDMINE EXPLOSION

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This invention relates to a method of protecting a body or hull and any occupant of a land vehicle, such as an armoured vehicle, e.g. an armoured tank or car, against the effects of a landmine explosion, e.g. an anti-tank landmine explosion. It relates also to a land vehicle, and to a combination of a ground engaging element for a land vehicle and a shock wave guide member.

When a vehicle sets off a landmine, generally the landmine explodes underneath a ground engaging element such as a wheel or track of the vehicle because of the ground pressure created by said ground engaging element on the landmine.

Japanese Patent document having a publication number 2002090095, discloses an apparatus for removing a mine buried under the ground surface. The apparatus includes a composite rotor having a plurality of 20 generally coaxial rollers loosely located with lost motion in a radial direction over a fixed axis shaft mounted on, so as spatially to lead, a vehicle. The rollers can individually follow contours, hollows, humps, etc. to trigger landmines. Behind the rotor there is provided a protective plate screening the landmine blast and protecting the vehicle and an occupant.

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Japanese Patent document having a publication number 2002340499, discloses a rotor including a plurality of blades. The rotor is rotated to cause the blades to cut into a ground surface to destroy mines. A curved safety cover is provided over the rotor to protect the vehicle and a driver from 30 sand, mud and landmine fragments. A low level grader-like blade deflects sand, mud and mine fragments laterally to provide a smooth running surface for the

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vehicle. It is notable that the vehicle is not intended to trigger landmines to explode, but to destroy landmines before explosion. The inventor thus did not 5 anticipate landmine explosions and resulting shock waves.

United States Patent 5442990 discloses a scarifying drum leading a track vehicle to explode landmines. A flap is provided over the drum to act as a shield.

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In accordance with a first aspect of the invention, there is provided a method of protecting a body or hull and any occupant of a land vehicle movable along a substrate on ground engaging elements against the effects of a landmine explosion, including conducting shock waves generated by the landmine 15 explosion laterally outwardly by means of a shock wave guide member of a material having a relatively high acoustic speed and located proximate a ground engaging element of the vehicle.

For purposes of this specification, terms denoting direction, such as 20 fore, rear, lateral, and the like should be interpreted with reference to a normal direction of forward travel of a land vehicle. The term "laterally outward" means "sideways away from (the land vehicle)".

By "relatively high" acoustic speed is meant an acoustic speed 25 higher than the acoustic speed of the metal used in components of the land

CLAIMS:

1. A method of protecting a body or hull and any occupant of a land vehicle movable along a substrate on ground engaging elements against the effects of a landmine explosion, including conducting shock waves generated by the landmine explosion laterally outwardly by means of a shock wave guide member of a material having a relatively high acoustic speed and located proximate a ground-engaging element of the vehicle.
- 10 2. A method as claimed in Claim 1 in which the material of each shock wave guide member is selected from materials including glass, a suitable ceramic such as an alumina, or the like, which have an acoustic speed of higher than about 6000 m/sec.
- 15 3. A method as claimed in Claim 1 or Claim 2 in which the vehicle is a track vehicle, the ground engaging elements being in the form of tracks, the guide members being located in at least one of a well of a bogey wheel and immediately above a bottom run of a track intermediate bogey wheels.
- 20 4. A method as claimed in Claim 1 or Claim 2 in which the vehicle is a wheeled vehicle, the ground engaging elements being in the form of wheels, the guide member being located in a well of the wheel.
- 25 5. A land vehicle movable along a substrate on ground engaging elements, which land vehicle is adapted or converted to protect its body or hull and any occupant against the effects of a landmine explosion, the land vehicle comprising a plurality of shock wave guide members proximate ground engaging elements of the land vehicle,
characterized in that the shock wave guide members are of a material having a relatively high acoustic speed higher than the acoustic speed of metal used in components of the land vehicle which components have an acoustic speed generally of about 5000 m/sec, the shock wave guide members being oriented to conduct shock waves laterally outwardly away from the body or hull.

6. A land vehicle as claimed in Claim 5, in which the material of each shock wave guide member is selected from materials, including glass, a suitable ceramic material such as an alumina, which materials have an acoustic speed of higher than about 6000 m/sec.
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7. A land vehicle as claimed in Claim 5 or Claim 6 which is in the form of a track vehicle, the ground engaging elements being in the form of tracks, in which the guide members are positioned in wells of bogey wheels, 10 as well as immediately above a bottom run of each track intermediate bogey wheels.
- 10
8. A land vehicle as claimed in Claim 7 in which the guide members proximate tracks intermediate bogey wheels have layers of low friction material on their surfaces interfacing with the tracks.
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9. A land vehicle as claimed in Claim 5 or Claim 6 which is in the form of a wheeled vehicle, the ground engaging elements being in the form of 20 wheels, in which the guide members are positioned annularly in wells of the wheels.
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10. A land vehicle as claimed in claim 5 or Claim 6 which is in the form of a wheeled vehicle, the ground engaging elements being in the form of 25 wheels, each wheel having a hollow tyre around a wheel rim, in which the guide members are positioned annularly in the hollows of the tyres.
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11. A land vehicle as claimed in any one of Claim 5 to Claim 10 inclusive in which the guide members are of composite construction, each 30 guide member comprising a plurality of oriented or directed laminates of a material having an acoustic speed of at least about 6000 m/sec.

12. A land vehicle as claimed in Claim 11 in which the laminates are sandwiched in-between layers of material having a relatively low acoustic speed, lower than about 1000 m/sec.
- 5 13. A land vehicle as claimed in Claim 11 or Claim 12 in which the laminates are oriented to extend obliquely laterally outwardly in use.
- 10 14. A land vehicle as claimed in Claim 11, or Claim 12 or Claim 13 in which said guide members have surfaces which are profiled snugly to be received with little clearance, or even slight touching, on surfaces of the ground engaging elements.
- 15 15. A ground engaging element for a land vehicle in combination with a shock wave guide member of a material having an acoustic speed of higher than about 6000 m/sec, the guide member being locatable proximate a ground engaging surface of the ground engaging element.
- 20 16. A combination as claimed in Claim 15, in which the ground engaging element is a track and bogey wheel arrangement for a track vehicle, the guide member being adapted for location in one of a well of a bogey wheel, and immediately above a lower run of the track intermediate bogey wheels.
- 25 17. A combination as claimed in Claim 15, in which the ground engaging element is a wheel for a wheeled vehicle, the guide member being adapted for location within a well of the wheel.
18. A combination as claimed in Claim 15, in which the ground engaging element is a wheel, having a hollow tyre, for a wheeled vehicle, the guide member being adapted for location within the hollow of the tyre.
19. A method as claimed in Claim 1, substantially as herein described and illustrated.

20. A land vehicle as claimed in Claim 5, substantially as herein described and illustrated.
21. A ground engaging element in combination with a shock wave guide member as claimed in Claim 15, substantially as herein described and illustrated.